

OPERATING EXPERIENCE WEEKLY SUMMARY

Office of Nuclear and Facility Safety

September 18 - September 24, 1998

Summary 98-38

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EVENTS

1. INCORRECT VALVE CONFIGURATION AT SAVANNAH RIVER

On September 12, 1998, at the Savannah River Site, operators aligned the handle for a plutonium processing system drain valve to the closed position in accordance with valve labeling, but the valve was actually open. The open valve diverted flow around the next process stage. When an on-line monitor displayed an increase in plutonium alpha activity, operators started shutting down the process in accordance with abnormal operating procedures. The monitor automatically closed a process isolation valve as alpha levels increased. The incident resulted in a process interruption. (ORPS Report SR--WSRC-FBLINE-1998-0026)

The facility is equipped with approximately 285 ball valves operated with reach-rods through plexiglass operating panels. The original design required the operating handles on these valves to be in the horizontal position for normal operating configuration, regardless of the position of the valve or the orientation of the valve body. In 1995, facility personnel undertook a program to reconfigure the valves so that the operating handles, extension rod coupling pins, and valve bodies were all parallel. The configuration control program included classifying each valve as determinate or indeterminate, depending on whether repairs had been completed, and maintaining a "valve index" to communicate this information to facility operating and configuration management personnel. (ORPS Reports SR--WSRC-FBLINE-1995-0009 and SR--WSRC-FBLINE-1995-0010)

The facility manager held a critique of this event. Attendees determined that maintenance personnel had reoriented the drain valve operating mechanism but did not update the valve index, modify valve position labeling, or notify operating personnel. They also determined that operating personnel positioned the drain valve correctly based on the information available to them. Following the event, the facility manager directed maintenance personnel to incorporate change information into the valve index promptly after they complete repairs. Maintenance personnel updated the index for all repairs made since the last update, and operating personnel used the information to perform a complete system alignment check.

OEAF engineers searched the ORPS database for related occurrences and located six additional events involving this same group of valves. These events include mispositioning valves during process startup or operation, mispositioning valves during lockout/tagouts, and using indeterminate valves for lockout/tagouts. Following are some examples.

- On March 13, 1995, facility personnel issued a maintenance lockout that included some valves classified as indeterminate in the valve index. The event resulted in a violation of lockout/tagout procedures because the barrier valves could not be positioned reliably. (ORPS Report SR--WSRC-FBLINE-1995-0010)
- On April 12, 1995, operators could not complete a chemical solution transfer because a valve verified to be closed in the system alignment check-sheet was actually open. Investigators determined that the valve was "grandfathered" as determinate in the valve index, when its configuration was actually indeterminate. (ORPS Report SR--WSRC-FBLINE-1995-0014)
- On August 8, 1995, operators performing a valve alignment check discovered a locked-out valve not in the required lockout position based on handle orientation and labeling. Investigators identified lack of control over as-found and as-left conditions for valve maintenance as a significant cause. The event resulted in a stand-down of all solution transfers pending a complete lockout/tagout audit. (ORPS Report SR--WSRC-FBLINE-1995-0042)

- On July 5, 1998, operating personnel questioned the actual position of three valves for which they were reinstalling operating handles following maintenance. Investigators determined that one of the valves was not in the specified position. They also determined that maintenance personnel had misinterpreted locking pin orientation when determining valve position. (ORPS Report SR--WSRC-FBLINE-1998-0015)

This event, and those preceding it at Savannah River, underscore the need to maintain positive control over the status of equipment affected by maintenance or modification. These events also illustrate the need to communicate changes in status to operating personnel on a real-time basis. Although the immediate effects of these events were limited to process interruptions or schedule delays, valve misalignments can introduce the potential for personnel injury, inadvertent releases, or inadvertent transfers. Configuration management programs should include clear direction about what activities constitute modification and should require well-established lines of communication among affected organizations. Configuration management managers and engineers should review the following documents.

- DOE O 5480.19, *Conduct of Operations Requirements for DOE Facilities*, chapter VIII, "Control of Equipment and System Status," states that DOE facilities are required to establish administrative control programs to handle configuration changes resulting from maintenance, modifications, and testing. The supervisor of operations is responsible for maintaining proper configuration and should ensure that operating personnel are aware of changes in status. Documentation of the status of work in progress should be available for review by operating personnel.
- DOE-STD-1073-93, *Guide for Operational Configuration Management Program*, provides guidelines and good practices for an operational configuration management program, including change control and document control. The guide provides program criteria and implementation guidance for establishing consistency among design requirements, physical configuration, and facility documentation and for maintaining this consistency. This standard states that an effective configuration management program increases the availability and retrievability of accurate information to support safe, sound, and timely decision-making related to facility design and operations. Section 2.1.2 describes the programmatic and organizational interfaces critical to a configuration management program. Section 2.1.3 describes criteria for the design and control of configuration management databases.
- DOE-STD-1039-93, *Guide to Good Practices for Control of Equipment and System Status*, section 4.7, states that the supervisor of operations should authorize all activities that change the status of systems or equipment important to safety or that affect operations. Section 4.8 states that post-maintenance testing should verify that maintenance was performed correctly and did not introduce problems.

KEYWORDS: administrative control, communication, conduct of operations, configuration management, valve

FUNCTIONAL AREAS: Conduct of Operations, Configuration Control, Operations

2. RADIATION WORK PERMIT NOT USED

On September 16, 1998, at the Oak Ridge Environmental Restoration Facility, two workers entered a radiation/contamination area without using the appropriate radiation work permit. The workers did not sign off on the permit, wear appropriate protective clothing, follow radiation protection procedures and posting requirements, or use health physics coverage as required by the permit. A radiological control technician surveyed the workers and the area. He found alpha contamination on one worker's shoes and removable alpha contamination on the floor immediately outside the contamination area. Failure to use a radiation work permit and comply with radiological postings resulted in the spread of contamination and could have resulted in personnel radiation exposure. (ORPS Report ORO--BJC-X10ENVRES-1998-0012)

Investigators determined that the workers removed radiological boundaries and postings that read "radiation area," "contamination area," and "RWP required for entry" to place a cover over a tank excavation. They also determined that the workers assumed the boundaries and postings applied to the pit within the area, not the area surrounding the pit.

NFS reported in Weekly Summary 98-14 that a worker completed a modification project without reading and following radiation work permit requirements. A radiological control technician knew the radiation work permit requirements had been violated and was concerned that the worker could have spread contamination. He performed smear surveys of the work area and determined that there was no spread of contamination. (ORPS Report ALO-LA-LANL-ACCCOMPLEX-1998-0004).

OEAF engineers searched the ORPS database for occurrences involving radiation work permit violations and identified 56 occurrences. A review of these occurrences shows that managers reported the root cause for 66 percent of these occurrences as personnel error and reported 29 percent as management problems. Figure 2-1 shows the distribution of root causes for these events. Further review of the personnel error shows that managers reported 36 percent as procedure not used or used incorrectly, 23 percent as inattention to detail, and 7 percent as other.

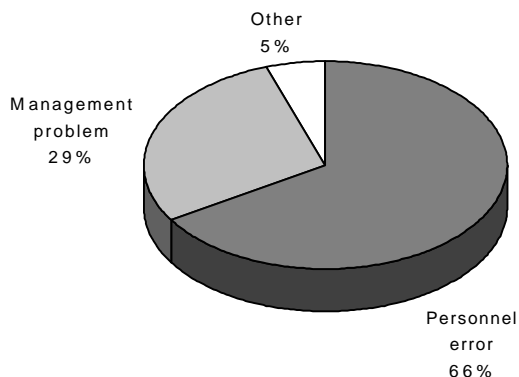


Figure 2-1. Distribution of Root Causes for Radiation Work Permit Violations¹

¹ OEAF engineers searched the complete ORPS database using the criteria '(rwp OR "radiation work permit") <NEAR/10> violat*' in cause narrative and found 77 occurrences. A 100 percent review of these events identified 56 occurrences related to radiation work permit violations.

These events illustrate the need for workers to be accountable and consider the consequences of performing work outside the scope of procedures, radiation work permits, and work packages. In this event, a worker was contaminated and spread contamination by performing maintenance without using the radiation work permit. The purpose of the permit is to clearly inform workers of conditions and entry requirements. When workers violate the requirements, they increase the probability of the spread of contamination and exposure to radiation. Workers must guard against complacency when performing routine work. Workers must also read and understand permits before signing them. Before signing a radiation work permit, personnel should be aware of (1) radiological conditions, (2) dosimetry requirements, (3) training requirements, (4) protective clothing and respiratory protection requirements, (5) stay times, and (6) conditions that may void the radiation work permit.

Personnel working at DOE facilities should have a continually questioning attitude toward safety issues. Each individual is ultimately responsible for complying with rules to ensure personal safety. Facility managers should communicate a sound policy stressing that safety is of prime importance and that all personnel must exhibit an individual commitment to excellence and professionalism. Managers should review the following guidance and ensure that radiological protection practices are followed and enforced.

DOE/EH-0256T, *Radiological Control Manual*, states: "Each person involved in radiological work is expected to demonstrate responsibility and accountability through an informed, disciplined, and cautious attitude toward radiation and radioactivity." The manual sets forth DOE guidance on the proper course of action in the area of radiological control, including work preparation; work controls; monitoring and surveys; and training and qualifications. Section 122, "Worker Attitude," states: "Minimizing worker radiation exposure can be achieved only if all persons involved in radiological activities have an understanding of and the proper respect for radiation." Section 123, "Worker Responsibilities," states that trained personnel should recognize that their actions directly affect contamination control, personnel radiation exposure, and the overall radiological environment associated with their work. The first rule of worker responsibility is to obey posted, written, and oral radiological control instructions and procedures, including instructions on radiological work permits. Section 322, "Use of Radiological Work Permits," states that workers shall acknowledge that they have read, understood, and will comply with the radiological work permit before initial entry to the area and after any revisions to the permit.

KEYWORDS: contamination area, radiological work permit, posting requirement

FUNCTIONAL AREAS: Radiation Protection

3. HALON SYSTEM DISCHARGE

On September 11, 1998, at the Hanford Site Plutonium Finishing Plant, Hanford Fire Department personnel were performing a halon system functional test when the halon system discharged. All personnel immediately evacuated the building, and no one was injured. Investigators determined that the discharge was the direct result of electricians disconnecting wires from a halon tank pressure monitoring device instead of a halon discharge actuator. They also determined that personnel performed the work using a generic work package for preventive maintenance of site fire protection systems. Mis-identifying actuator wires while conducting operability checks resulted in inadvertent actuation of a fire suppression system. (ORPS Report RL--PHMC-PFP-1998-0040)

Investigators determined that Hanford Fire Department personnel deactivated the fire alarm panel, warned personnel in the building of the work that was to be performed, and described actions personnel should take if the halon system accidentally discharged. They then placed the "armed/disarmed" switch in the disarmed position. Electricians opened a junction box and disconnected what they thought were the actuator wires. The Hanford Fire Department captain activated the manual pull station, and the electricians observed no response at the actuator. Hanford Fire Department personnel reset the pull station and placed the "armed/disarmed" switch in the armed position. When personnel activated the pull station, the halon system discharged. Investigators determined that the work package did not provide details for deactivating the halon system and did not include a wiring diagram. Figure 3-1 shows the junction box, actuator, and pressure monitor. The halon system will remain on a reserve tank until personnel refill the main tank.

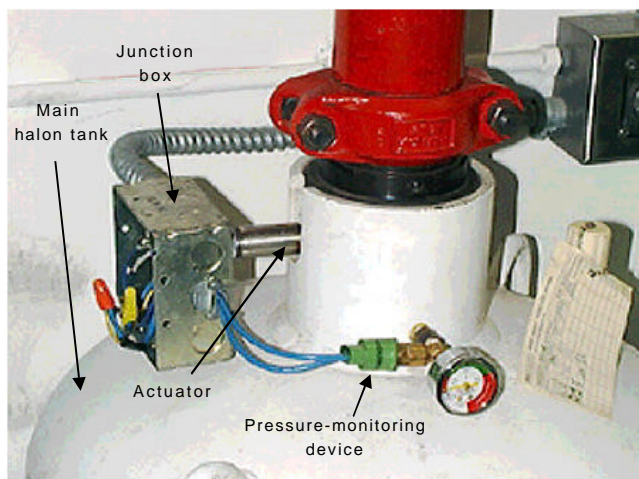


Figure 3-1. Halon System Junction Box

NFS has reported similar events involving electrical work control deficiencies in several Weekly Summaries. Following are some examples.

- Weekly Summary 98-13 reported that a control room operator at the Savannah River Site F-Area Tank Farm discovered that a general alarm in an unmanned area was not received at the control room as expected during routine conductivity probe checks. Investigators determined that the operator did not receive the alarm because a worker lifted the alarm leads during performance of a design change work package and left them that way when he completed the work. Investigators determined that an error in the design change work package led to the worker lifting the leads. (ORPS Report SR--WSRC-FTANK-1998-0008)

- Weekly Summary 97-03 reported that a subcontractor communications technician at the Oak Ridge Y-12 Site inserted a "fish tape" into the wrong conduit where it contacted an energized 13.8-kV electrical switch box. The technician was installing communication cables using approved work package drawings. However, one of the drawings incorrectly showed a 4-inch conduit, rather than the 3-inch one the technician was supposed to access. (ORPS Report ORO--USW-ORFICNY12-1997-0001)

These events underscore the importance of having detailed procedures and drawings, even when the task seems simple and straightforward. Planners must use the best available drawings and should consider conducting detailed walk-downs to ensure wires are correctly identified. These events also underscore the importance of technicians maintaining questioning attitudes and paying attention to detail to ensure that operability tests are performed safely. If electricians had correctly identified the actuator wires in the junction box, this event could have been prevented. Technicians should be trained in the importance of questioning attitudes and attention to detail. They also must be trained in how to correctly perform independent verifications.

Facility managers, technicians, work planners should review the following references.

- DOE-STD-1029-92, *Writers Guide For Technical Procedures*, provides guidance to assist procedure writers across the DOE complex in producing accurate, complete, and usable technical procedures that promote safe and efficient operations. This guidance can also be applied to other technical documents such as work plans. Section 2.3, "Facility Configuration," requires walk-downs, simulations, modeling, or desk-top reviews to ensure procedures are technically accurate and adequate.
- DOE-STD-1050-93, *Guideline to Good Practices for Planning, Scheduling and Coordination of Maintenance at DOE Nuclear Facilities*, section 3.1.1.3, provides the key elements of an effective planning program. The standard includes guidance recommending that experienced individuals conduct thorough reviews of work plans to eliminate any errors or confusion.
- DOE/EH-0502, Safety Notice 95-02, "Independent Verification and Self-Checking," describes a technique that requires workers to (1) stop before performing the task to eliminate distractions and identify the correct component; (2) think about the task, expected response, and actions required if that response does not occur; (3) act by reconfirming the correct component and performing the function; and (4) review by comparing the actual versus the expected response.

Safety Notices can be obtained by contacting the ES&H Information Center, (301) 903-0449, or (800) 473-4375, or by writing to U.S. Department of Energy, ES&H Information Center, EH-72, 19901 Germantown Road, Germantown, MD 20874. Safety Notices are also available on the OEAF Home Page at http://tis.eh.doe.gov:80/web/oeaf/lessons_learned/ons/ons.html.

KEYWORDS: halon, work planning, fire protection

FUNCTIONAL AREAS: Work Planning, Fire Protection

4. BREATHING AIR COMPRESSOR OPERATED WITH EXPIRED AIR QUALITY CHECK

On September 15, 1998, at the Idaho National Engineering and Environmental Laboratory, a worker discovered that the air quality check on a portable breathing air compressor had expired on September 7, 1998. The compressor operating procedure required the compressor operator to check the expiration date each time the compressor was started. Investigators determined that workers used the compressor six times after the check expired. Failure to follow procedures led to air quality checks not being performed and could have led to workers being supplied with inadequate breathing air. (ORPS Report ID--LITC-PHASEOUT-1998-0004)

The compressor supplies breathing air to respirators worn by workers supporting deactivation work at the Waste Calcining Facility. Investigators determined that the air quality check is part of a quarterly preventive maintenance activity. However, the preventive maintenance for the compressor was not completed by the September 7, 1998, due date. They also determined that three different operators used the compressor six separate times after September 7. The facility manager ordered workers to stop deactivation work. He also ordered personnel to tag the compressor out of service. The facility manager initiated an inspection of other portable breathing air compressors. Workers identified one other compressor with expired preventive maintenance and tagged it out of service.

NFS reported similar events involving failure to follow procedures when performing surveillances in several Weekly Summaries. Following are some examples.

- Weekly Summary 98-29 reported that a radiological control technician performing a daily operability calibration at the Los Alamos National Laboratory Chemistry and Metallurgy Research Facility discovered that the calibration date for a continuous air monitor had expired, violating facility operational safety requirements. Health Physics Operations personnel are reviewing operational safety requirement surveillances and procedure-required daily checks of continuous air monitors to determine how facility personnel failed to notice the expired calibration. (ORPS Report ALO-LA-LANL-CMR-1998-0029)
- Weekly Summary 98-07 reported that facility workers at the Mound Plant Tritium Facilities determined that a data-logging computer for radiation monitoring systems had been off-line for 9 days, even though the operational controls (authorization basis) manual for the facility required daily surveillance of the computer. (ORPS Report OH-MB-BWO-BWO01-1998-0003)
- Weekly Summary 97-46 reported that fire protection personnel at the Rocky Flats Environmental Technology Site reviewed completed surveillances, performed a monthly surveillance, and did not notice a closed valve or see that several others were not locked open as required by the surveillance procedure. (ORPS Report RFO--KHLL-371OPS-1997-0097)

These events underscore the importance of verifying, validating, and using procedures, as well as following them step-by-step. In many cases, operating procedures are relied upon to verify that calibrations and other quality checks have been performed. These events also underscore the importance of workers assuming responsibility for their work, paying attention to detail, and adhering to procedures and instructions.

Many operating procedures contain steps that require the operator to perform an important surveillance activity. DOE facility managers should review their surveillance practices and ensure that personnel who use operating procedures clearly understand their surveillance responsibilities.

- DOE O 5480.19, *Guidelines for the Conduct of Operations Requirements for DOE Facilities*, chapter I, "Operations Organization and Administration," states that workers and their supervisors should be held accountable for operating performance. Personnel involved in significant or frequent violations of operating practices should be counseled, retrained, and disciplined, as appropriate. DOE facility managers should ensure that all operators and supervisors are familiar with operating procedures and understand their purpose and use. This understanding is even more important when personnel safety issues are involved.
- DOE O 5480.22, *Technical Safety Requirements*, attachment 1, describes the purpose of surveillance requirements and states that each surveillance shall be performed within the specified interval. General principle 1 states: "A system is considered operable as long as there exists assurance that it is capable of performing its specified safety function(s)." Surveillance testing is essential in providing this assurance.

KEYWORDS: breathing air, compressor, procedures, surveillance,

FUNCTIONAL AREAS: Procedures, Surveillance

OEAF FOLLOW UP ACTIVITY

1. IDAHO FATALITY FOLLOW-UP INFORMATION

Weekly Summaries 98-30 and 98-33 reported that an electrician died at the Idaho National Engineering and Environmental Laboratory Test Reactor Area after fire retardant (carbon dioxide) was accidentally discharged during scheduled electrical maintenance operations. The Type A Accident Investigation report on this event is now available on the Internet at URL http://tis.eh.doe.gov/oversight/acc_inv/acc_investigations.html. The Office of Environment, Safety, and Health will also issue a Safety Notice on this event. OEAF engineers will provide additional information upon issuance of the Safety Notice. (ORPS Report ID--LITC-TRA-1998-0010)

KEYWORDS: carbon dioxide, electrical maintenance, fatality, fire retardant

FUNCTIONAL AREAS: Electrical Maintenance, Fire Protection, Industrial Safety